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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,800	06/28/2001	Michael J. Peterson	S01.12-0746/STL 9879	7097

7590

10/04/2002

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EXAMINER

PATEL, ISHWARBHAI B

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 10/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/893,800

Applicant(s)

PETERSON ET AL.

Examiner

Ishwar (I. B.) Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 16-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-14 and 16-20, drawn to a flex circuit, classified in class 174, subclass 254.
 - II. Claim 15, drawn to a method for limiting a collapse of a chip during a reflow attachment of the chip to a flex circuit, classified in class 29, subclass 840.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by providing non-operational bump on the chip instead of non-operational pad on the substrate.

Furthermore, the positioning reflowable material on the plurality of connection pads is not required in the product. The reflowable material can be provided on the bumps of the chip.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, and the

search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Christopher Holt on September 12, 2002, a provisional election was made with traverse to prosecute the invention of a flex circuit, group I, claims 1-14 and 16-20. Affirmation of this election must be made by applicant in replying to this Office action. Claim 15 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings

6. The drawings are objected to because figures are improperly cross hatched. All of the parts shown in section, and only those parts, must be cross hatched. The cross hatching pattern should be selected from those shown on page 600-81 of the MPEP based on the material of the part. See also 37 CFR 1.84(h)(3) and MPEP 608.02.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 2, 3, 5-9 and 16-18, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kusui, US Patent 6,441,316, in view of Frankeny et al., US Patent 5,065,227, hereafter Frankeny.

Regarding claims 1, 16 and 17, Kusui discloses a circuit board comprising:

a connection pad and a trace operably disposed on an operating surface of the flex circuit substrate, the trace being adjacently and operably connected to the connection pad (land 2 and patterned wire 3, see figure 1-2, column 4, line 1-10); and

a barrier that crosses the trace and is configured to limit a flow of material down the trace (resist layer 6, see figure 1-2, column 4, line 1-10), but

Kusui does not explicitly disclose the type of the substrate used, which can be either rigid or flex depending upon the specific requirement. The flex circuits are used for the apparent reason of having flexibility during the first installation or during the entire useful life. Both the rigid and flex circuit boards are well known in the art. Further, Frankeny et al. discloses one such flex circuit board used in a semiconductor device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the assembly of Kusui with flexible substrate as taught by Frankeny in order to have flexibility either during first installation or during the life cycle.

Regarding claim 2, Kusui further discloses the barrier spaced from the connection pad, see figure 1 and 2.

Regarding claims 3 and 5, though Kusui does not disclose a specific distance between the connection pad and the barrier or any relation of the pad diameter with the distance, the distance will depend upon various factors such as the width of the trace, the type of connection of pad with trace, such as tapered connection or the straight connection, size of the pad, quantity of the solder on the pad or on the bump etc., to have reliable and strong connection of the chip. Also the distance decided / designed for specific device to be tested for the quality of the connection as disclosed by Kusui. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified assembly of Kusui with distance

between the pad and barrier less than one-half the diameter of the connection pad as claimed in claim 3 or between the range of approximately one-half to two times the diameter of the connection pad as claimed in claim 5 in order to get a strong and reliable solder connection.

Regarding claim 6, the modified assembly of Kusui further discloses the barrier formed by a cover layer selectively deposited and covers a substantial portion of the operating surface of the circuit substrate, see Kusui figure 1.

Regarding claims 7 and 18, the modified assembly of Kusui further discloses the barrier formed by a cover layer cover the trace and a substantial portion of the operating surface of the flex circuit of the flex circuit substrate, the connection pad being exposed, free of the cover layer, see Kusui figure 1.

Regarding claim 8 and 9, the modified assembly of Kusui further discloses barrier formed by a cover the substantial portion of the operating surface, leaving connection pad and portion of trace proximate the connection pad exposed, free of the cover layer, see Kusui figure 1.

9. Claims 4, 10-13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kusui, US Patent 6,441,316 and Frankeny et al., US Patent 5,065,227, hereafter Frankeny as applied to claims 1-3 above, and further in

view of Takigami, US Patent 6,218,630 and Schelhorn, US Patent 5,001,829 and Moore et al., US Patent 5,327,013, hereafter Moore and Suzuki US Patent 5,925,445.

Regarding claim 4, the applicant is claiming the barrier layer contacts the connection pad. Though Kusui does not disclose such connection, it will depend upon the specific system requirement. Kusui is positively keeping a distance for testing the connection, but if such testing is not required, the barrier can be designed either just contacting the pad or even with complete covering the periphery of the pad. Takigami disclose both resist keeping the pads open or covered on the periphery depending upon the specific requirement. Schelhorn discloses resist material touching the pad and Moore disclose stop 28 figure 1, crossing the trace and touching the pad for stopping the flow of solder. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified assembly of Kusui with barrier touching the pad as taught by Takigami, Schelhorn and Moore in order to stop have the control solder flow on the trace depending upon the specific requirement.

Regarding claims 10 and 19, the applicant is claiming barrier is formed by barrier strips disposed on the operating surface of the flex circuit substrate. Though Kusui does not disclose such strip, such strips are known in the art and can be provided depending upon the specific requirement of the system to separate the region of the substrate for chip connection and external connection or controlling the solder flow. Moore discloses such strip to control the flow of the solder and Suzuki discloses strips 4a, 4b, 4c and 4d

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for separating the areas. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified assembly of Kusui with barrier strip on the operating surface of the flex circuit substrate as taught by Suzuki and Moore, in order to control the flow of solder or to separate the regions for specific connections.

Regarding claim 11, though Kusui is disclosing cover made of photo resist, any known material can be used depending upon the specific requirement for protecting traces and the surface of the substrate and also for controlling the flow of the solder, and use of cured dry film solder mask is also known in the art. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified assembly of Kusui with barrier made of cured dry film solder mask in order to have the protection of the traces and surface of the substrate and to control the flow of the solder. Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125, USPQ 416.

Regarding claim 12, Kusui further disclose barrier made of photo resist, column 4, line 1-10.

Regarding claim 13, the modified assembly of Kusui discloses all the features of the claimed invention as applied to claim 10, including the barrier strip located within the cover layer open area.

10. Claims 14 and 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kusui, US Patent 6,441,316, and Frankeny et al., US Patent 5,065,227, hereafter Frankeny as applied to claims 1-3 above, and further in view of Kondo et al., US Patent 6,303,878, hereafter Kondo.

Regarding claims 14 and 20, though Kusui does not disclose about the leadless connection pads, such pads / dummy pads or bumps made either on the chip or the substrate is known in the art for controlling the spacing between the substrate and the component. Kondo discloses such pads, Kondo – column 4, line 25-30, for controlling the solder bump height. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified assembly of Kusui with leadless connection pads as taught by Kondo in order to control the height of the solder bumps.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shirasaki et al., Otani et al., Shizuki et al., Moriyama, Watanbe, Hino et al., Putnam, disclose circuit board similar to applicant's claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (703) 305 2617. The examiner can normally be reached on M-F (6:30 - 4) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L Talbott can be reached on (703) 305 9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3431 for regular communications and (703) 305 7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

ibp
September 25, 2002

 9-27-02
ALBERT W. PALADINI
PRIMARY EXAMINER

Art Unit: 1725

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-14, drawn to an article, classified in class 174.
 - II. Claim 15, drawn to a method, classified in class 228.
 - III. Claims 16-20, drawn to an apparatus, classified in class 174.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by a different process such as conductively adhesive bonding.
3. Inventions II and III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be performed by conductively adhesive bonding.
4. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.
5. Because these inventions are distinct for the reasons given above and the search required for Group II is not required for Group III, restriction for examination purposes as indicated is proper.

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6. During a telephone conversation with Mr. Chris Hotlz on February 13, 2002 a provisional election was made with traverse to prosecute the invention of group I, claims 1-14. Affirmation of this election must be made by applicant in replying to this Office action. Claims 15-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.